The opinion in support of the decision being entered today was ***not*** written for publication and is ***not*** binding precedent of the Board.

Paper No. 27

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

Ex parte ROBERTO J. RIOJA,
GARY H. BRAY, JAMES T. DURHAM
and DIANA K. DENZER

Appeal No. 2004-0109
Application 09/324,549

HEARD: March 2, 2004

Before WARREN, DELMENDO and PAWLIKOWSKI, *Administrative Patent Judges*.

WARREN, *Administrative Patent Judge*.

Decision on Appeal

This is an appeal under 35 U.S.C. § 134 from the decision of the examiner finally rejecting claims 19, 21 through 35, 37 and 40 through 44, all of the claims in the application. Claim 19 is illustrative of the claims on appeal:

> 19. An aluminum alloy consisting essentially of from about 5 to 11 wt % zinc, from about 1 to 3 wt % copper, from about 1 to 3 wt % magnesium, from about 0.10 to 0.4 wt % lithium and less than 0.1 wt % silicon, and being substantially free of beryllium, wherein the alloy is capable of attaining a yield strength (L) above 80 ksi and a fracture toughness above about 33 ksi√inch.

The appealed claims, as represented by independent claim 19 on which all other claims depend, are drawn to an aluminum alloy consisting essentially of at least the specified elements, each of which is present in an amount that falls within the specified percent by weight range for that element. Appellants claim and disclose that the encompassed aluminum alloys are capable of attaining a yield strength (L) above 80 ksi and a fracture toughness above about 33 ksi√inch (specification, e.g., page 4, lines 7-16).

The references relied on by the examiner are:

Rioja et al. (Rioja '792)	4,961,792	Oct. 9, 1990
Rioja et al. (Rioja '859)	5,076,859	Dec. 31, 1991

The examiner has rejected appealed claims 19, 21 through 35, 37 and 40 through 44 under 35 U.S.C. § 103(a) as being unpatentable over Rioja '792 or Rioja '859 (answer, page 4).[1]

Appellants state that "Claim 41 stands or falls alone" and that all other appealed claims "stand or fall together" (brief, page 3). The examiner acknowledges the two groups of claims but holds that all of the claims stand or fall together because appellants fail "to provide reasons in support thereof" (answer, page 2). Appellants respond in the reply brief (page 2) that claim 41 stands alone because of reasons provided in the brief with respect to United States Patent 4,869,870 to Rioja et al., but acknowledge that the argument is moot because this Rioja patent is not relied on in the answer. Based on this record, we conclude that all of the appealed claims stand or fall with appealed independent claim 19, and accordingly, we decide this appeal based on appealed claim 19. 37 CFR § 1.192(c)(7) (2002).

We affirm.

Rather than reiterate the respective positions advanced by the examiner and appellants, we refer to the examiner's answer and to appellants' brief for a complete exposition thereof.

Opinion

We have carefully reviewed the record on this appeal and based thereon find ourselves in agreement with the examiner that the claimed aluminum alloy encompassed by appealed claim 19 would have been *prima facie* obvious over Rioja '792 or Rioja '859 (answer, page 4) to one of ordinary skill in this art at the time the claimed invention was made.

[1] The examiner specifically withdrew the ground of rejection under 35 U.S.C. § 112, first paragraph, written description requirement (answer, page 2), and did not advance in the answer seven (7) references relied on in the ground of rejection under 35 U.S.C. § 103(a), which grounds are set forth in the final action mailed June 18, 2003 (Paper No. 14).

In order to consider the threshold issue of whether the claimed aluminum alloys as defined by the appealed claim 19 would have been *prima facie* obvious over the aluminum alloys taught by Rioja '792 or Rioja '859, we must first interpret the language of appealed claim 19 by giving the claim terms their broadest reasonable interpretation consistent with the written description provided in appellants' specification as it would be interpreted by one of ordinary skill in this art, *see*, e.g., *In re Thrift*, 298 F.3d 1357, 1364, 63 USPQ2d 2002, 2006 (Fed. Cir. 2002); *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027 (Fed. Cir. 1997); *In re Zletz*, 893 F.2d 319**,** 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989); *In re Herz*, 537 F.2d 5649, 551, 190 USPQ 461, 463 (CCPA 1976), without reading into these claims any limitation or particular embodiment which is disclosed in the specification. *See Zletz*, *supra*; *In re Priest*, 582 F.2d 33, 37, 199 USPQ 11, 15 (CCPA 1978).

We determine from the plain language thereof that appealed independent claim 19 encompasses "[a]n aluminum alloy" that consist essentially of at least of the characterizing element "aluminum" (Al), and the stated elements, zinc (Zn), copper (Cu), magnesium (Mg), lithium (Li), silicon (Si), wherein the stated elements are present in an amount falling within the weight percent range for the respective element, regardless of the amount(s) of any other element(s) that can be included therein by reason of the transitional term "consisting essentially of," wherein the "aluminum alloy" is at least *capable of attaining* a yield strength (L) above 80 ksi and a fracture toughness above about 33 ksi√inch without limitation on the method or steps thereof by which the alloy is processed to attain such properties. With respect to the claimed ranges, we interpret the range of "less than 0.1 wt % silicon" to include "zero" as a lower limit.

We find no express limitation in appealed claim 19 specifying the amount of "aluminum" in the claimed "aluminum alloy," but for purposes of this appeal determine that a reasonable, *conditional* interpretation of claim 19 is that the claimed "aluminum alloy" contains some amount of aluminum, however small, noting that the written description in the specification discloses that "aluminum" along with "incidental impurities" form the "balance" of the "aluminum alloy" (specification, page 4, lines 24-25; *cf.* Rioja '792 claim 1). Thus, the "balance" or amount of aluminum present is based on the amounts of the specified elements and any other elements present in the alloy.[2]

The transitional term "consisting essentially of" appearing in appealed claim 19 is used in claim construction to indicate that "the invention necessarily includes the listed ingredients and is open to unlisted ingredients that do not materially affect the basic and novel properties of the invention." *PPG Indus., Inc. v. Guardian Indus. Corp.*, 156 F.3d 1351, 1354, 48 USPQ2d 1351, 1353-54 (Fed. Cir. 1998). Thus, the interpretation of this transitional term requires a determination of whether the inclusion in the claimed compositions additional element(s) in the amount(s) taught in the applied prior art would materially affect the basic and novel characteristics of the claimed composition, because this phrase customarily excludes such materials. *See Herz*, *supra* (explaining *Ex parte Davis*, 80 USPQ 448 (Pat. Off. Bd. App. 1948)). In arriving at this determination, the written description of the written description in appellants' specification must be considered. *Herz; supra* ("[I]t is necessary and proper to determine whether [the] specification reasonably supports a construction" that would exclude or include particular ingredients.); *see also PPG Indus.*, 156 F.3d at 1354-57, 48 USPQ2d at 1353-56 (Patentees "could have defined the scope of the phrase 'consisting essentially of' for purposes of its patent by making clear in its specification what it regarded as constituting a material change in the basic and novel characteristics of the invention. The question for our decision is whether PPG did so.").

Our review of the written description in the specification reveals that certain elements,

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[2] The matter of the amount of aluminum raises issues under 35 U.S.C. § 112, second paragraph, with respect to appealed claim 19 because, even upon considering the interpretation of the claim language in light of the written description in the specification, and we will not read such a limitation into the claim, the same is, at best, indefinite with respect to the embodiments encompassed. However, in order to resolve prior art issues in this appeal, thus avoiding piecemeal prosecution, we use the reasonable, *conditional* interpretation of the claim language stated above. *Cf. In re Steele*, 305 F.2d 859, 862-63, 134 USPQ 292, 295 (CCPA 1962); *Ex parte Saceman*, 27 USPQ2d 1472, 1474 (Bd. Pat. App. & Int. 1993). We decline to exercise our authority under 37 CFR § 1.196(b) (2003) and enter on the record a new ground of rejection of the appealed claim 19 and claims dependent thereon with respect to this issue, leaving it to the examiner to address the same upon any further examination of the appealed claims before the examiner.

that is, chromium, vanadium, titanium zirconium (Zr), manganese (Mn), nickel, iron (Fe), hafnium, scandium, silver (Ag), Si and indium, *may* materially affect the basic and allegedly novel characteristics of the claimed aluminum alloys with respect to being capable of attaining the specified yield strength and fracture by any manner of method or steps thereof, when used over certain amounts (specification, e.g., page 4, line 26, to page 5, line 5). However, except to the extent that it is established by appellants that the disclosed and additional amounts of such elements materially affect such basic and allegedly novel characteristics of the claimed aluminum alloys, we find no basis in either the language of claim 19 or in the specification on which to read the amount limitations with respect to the certain elements into claim 19. We further find no additional disclosure in the written description of the specification which otherwise addresses other additional elements that materially affect such basic and allegedly novel characteristics of the claimed aluminum alloys. We note in this respect that it is appellants' burden to establish that any elements contained by the alloys of the Rioja references which are not specified in appealed claim 19 would be deleterious to the basic and allegedly novel characteristics of the aluminum alloys falling within this claim, and thus excluded from the claims by use of the transitional term "consisting essentially of."[3] *See PPG Indus., supra; Herz, supra*.

Accordingly, the claimed aluminum alloys encompassed by appealed claim 19 exist whenever the specified elements and any other permissible elements are combined in an amount for each element permitted by the claim, with the exception of the element aluminum for which no amount is specified, without regard to the extent to which the alloy has been worked, provided that the alloy is capable of attaining the specified properties of yield strength and fracture toughness. *See Exxon Chemical Patents Inc. v. Lubrizol Corp.*, 64 F.3d 1553, 1555-58,

[3] We note here that we find *no* written description by any means in the specification of aluminum alloys that consist essentially of at least the specified elements in the amounts stated "and being substantially free of beryllium" as encompassed by appealed claim 19, and indeed, "beryllium" *per se* is nowhere disclosed in the specification. While this limitation clearly raises the issue of the compliance of claim 19 with the written description requirement of 35 U.S.C. § 112, first paragraph, we nonetheless address the application of the Rioja patents to this claim under § 103(a). *Cf. Ex parte Grasselli*, 231 USPQ 393 (Bd. App. 1983), *aff'd mem.*, 738 F.2d 453 (Fed. Cir 1984). As above (*see* note 2), we decline to exercise our authority under 37 CFR § 1.196(b) (2003) with respect to this issue, leaving it to the examiner to address upon any further examination of the appealed claims before the examiner.

35 USPQ2d 1801, 1802-05 (Fed. Cir. 1995) ("Consequently, as properly interpreted, Exxon's claims are to a composition that contains the specified ingredients at any time from the moment at which the ingredients are mixed together."). Furthermore, in view of the phrase "consisting essentially of" taken in light of the specification as we discussed above, we find that the claimed alloys can contain Zr at least in the range of "0.0 to 0.6 wt %," Mn and Fe at least in the range of "0 to 1 wt %" and Ag at least in the range of "up to about 1.0 wt %" (specification, page 4, line 28, to page 5, line 5), and compare the claimed aluminum alloys of appealed claim 19 with the aluminum lithium alloys disclosed by Rioja '792 and '859 on this basis.

Turning now to the prior art applied on appeal, we find that Rioja '792 discloses and claims aluminum lithium alloys wherein

> [t]he product comprises 0.2 to 5.0 wt.% Li, 0.05 to 6.0 wt.% Mg, at least 2.45 wt.% Cu, 0.05 to 0.16 wt.% Zr, 0.05 to 12 wt.% Zn, 0.5 wt.% max. Fe, 0.5 wt.% max Si, the balance aluminum and incidental impurities. [Abstract; col. 2, lines 35-39; Rioja '792 claim 1.]

Rioja '792 additionally discloses that

> [t]he alloy of the present invention can contain 0.2 to 5.0 wt.% Li, 0 to 5.0 wt.% Mg, up to 5.0 wt.% Cu, 0 to 1.0 wt.% Zr, 0 to 2.0 wt.% Mn, 0.05 to 12.0 wt.% Zn, 0.5 wt.% max. Fe, 0.5 wt.% max Si, the balance aluminum and incidental impurities. [Col. 2, lines 62-66.]

Rioja '792 further discloses alloys that

> can contain 0.2 to 5.0 wt.% Li, at least 2.45 wt.% Cu, 0.05 to 5.0 wt.% Mg, 0.05 to 0.16 wt.% Zr, 0.05 to 12 wt.% Zn, the balance aluminum and incidental impurities. [Col. 3, lines 3-7.]

Rioja '792 also discloses

> a lithium-containing aluminum base alloy product consisting essentially of 0.2 to 5.0 wt.% Li, 0.05 to 6.0 wt.% Mg, 2.45 to 2.95 wt.% Cu, 0.05 to 0.12 wt.% Zr, 0.05 to 12 wt.% Zn, 0.5 wt.% max. Fe, 0.5 wt.% max Si, the balance aluminum and incidental impurities. [Rioja '792 claim 19; col. 16, lines 34-39.]

We further find that Rioja '792 would have taught one of ordinary skill in this art[4] the function of the different elements and the amounts thereof in aluminum lithium alloys (e.g.,

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[4] It is well settled that a reference stands for all of the specific teachings thereof as well as the inferences one of ordinary skill in this art would have reasonably been expected to draw therefrom, see *In re Fritch*, 972 F.2d 1260, 1264-65, 23 USPQ2d 1780, 1782-83 (Fed. Cir.

col. 3, line 13, to col. 4, line 68), and, in this respect, discloses that "less than 0.5 wt.% Li does not provide for significant reductions in the density of the alloy. It is not presently expected that higher levels of lithium would improve the combination of toughness and strength of the alloy product" (col. 3, lines 23-28). This person would have reasonably inferred from the quoted passage that at least some reduction in density is achieved at less than 0.5 wt.% Li even if not "significant," and that a larger amount of Li does not necessarily improve toughness and strength. Rioja '792 would have also disclosed that "if it is desired to increase toughness at a given strength level, then Cu should be added" (col. 3, lines 36-38). We still further find that Rioja '792 would have disclosed the processing steps, including artificial aging, whereby the aluminum lithium alloys can attain yield strengths as high 95 ksi, wherein "useful strengths are in the range of 50 to 85 ksi and corresponding fracture toughnesses are in the range of 25 to 75 √in." (e.g., col. 5, line 22, to col. 9, line 17, particularly col. 7, lines 55-66; Rioja '792 claim 19).

We find that one of ordinary skill in this art routinely following these teaching of Rioja '792 would have reasonably arrived at aluminum lithium alloys which are capable of attaining the properties taught by the reference. In other words, one of ordinary skill in this art can select the elements from among those disclosed, in any amount within the weight percent range taught for each element, to form an aluminum lithium alloy that is capable of attaining yield strength and fracture toughness within the ranges for these properties taught by Rioja '792. Indeed, Rioja '792 would have disclosed to this person the function of the elements, separately and combined, such as the disclosure that "while lithium is the most important element for saving weight, the other elements are important in order to provide the proper levels of strength, fracture toughness, corrosion and stress corrosion cracking resistance" (col. 3, lines 29-49).

Upon comparing the claimed aluminum alloys encompassed by appealed claim 19 with the aluminum-lithium alloys disclosed by Rioja '792, we find with respect to each of the four groups of alloys in the reference, that the claimed weight percent ranges, including the weight percent ranges disclosed for Zr, Fe and Mn which can be present, either fall *within* or *encompass* the weight percent ranges in the reference, except for the amount of Cu and Li. In the latter case,

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1992); *In re Preda*, 401 F.2d 825, 826, 159 USPQ 342, 344 (CCPA 1968), presuming skill on the part of this person. *In re Sovish*, 769 F.2d 738, 743, 226 USPQ 771, 774 (Fed. Cir. 1985).

the claimed and reference weight percent ranges *overlap* with respect to Cu in the first and third groups of the reference alloys, and with respect to Li in all four groups of reference alloys. With respect to Li, the overlap is at the lower end of the weight percent ranges, that is, "0.1" in appealed claim 19, and "0.2" in each of the four alloy groups of Rioja '792. Furthermore, Rioja '792 discloses that the aluminum lithium alloys disclosed therein are capable of attaining yield strength and fracture toughness within ranges which overlap with the ranges for these properties in appealed claim 19.

We find that Rioja '859 discloses lithium-containing aluminum base alloys which

> can contain 0.2 to 5.0 wt.% Li, 0 to 5.0 wt.% Mg, up to 5.0 wt.% Cu, 0 to 2 wt % Ag, 0 to 1.0 wt.% Zr, 0 to 1.0 wt.% Mn, 0 to 9.0 wt.% Zn, 0.5 wt.% max. Fe, 0.5 wt.% max Si, the balance aluminum and incidental impurities. [Col. 2, lines 50-55; Rioja '859 claims 13, 36, 43 and 49.]

Rioja '859 also discloses lithium-containing aluminum base alloys which can

> contain 0.5 to 4.0 wt.% Li, 0.1 to 6.0 wt.% Mg, at least 0.6 wt.% Cu, 0.05 to 12 wt.% Zn, 0 to 0.8 wt.% Mn, 0 to 0.15 wt.% max Zr, 0.05 to 1 wt % Ag, 0.5 wt.% max. Fe, 0.5 wt.% max Si, the balance aluminum and incidental impurities. [Col. 2, lines 62-66; Rioja '859 claims 21, 37, 44 and 50.]

We further find that Rioja '859 would have taught one of ordinary skill in this art the disclosed that processing the aluminum-lithium alloys by processes including the aging treatment disclosed therein, enhances the yield strength and fracture toughness of the alloys (cols. 1-4). Indeed, it is disclosed that

> the presence of lithium in combination with other controlled amounts of alloying elements permits the fabrication of aluminum alloy products which can be worked to provide unique combinations of strength and facture toughness while maintaining meaningful reductions in density. It will be appreciated that less than 0.5 wt. % Li does not provide for significant reductions in the density of the alloy . . . . [Col. 3, lines 12-26.]

We determine that one of ordinary skill in this art would have inferred from this quoted passage in light of the disclosure of the reference as a whole that at least some reduction in density is achieved at less than 0.5 wt.% Li even if not "significant," and that toughness and strength is provided by lithium in combination of with other elements of the alloy. We further find that that Rioja '859 discloses in Table 1 and in **FIG. 3** thereof that the disclosed processes can provide a number of different yield strength (L) and fracture toughness properties for the *same* alloy, and in at least two examples, the alloy as worked attained a yield strength (L) above about 80 ksi and a fracture toughness above about 33 ksi√inch (see col. 4, lines 54-66).

We find that one of ordinary skill in this art routinely following these teaching of Rioja '859 would have reasonably arrived at aluminum alloys which are capable of attaining the properties taught by the reference. Thus, one of ordinary skill in this art can select the elements from among those disclosed, in any amount within the weight percent range taught for each element, to form an aluminum alloy that is capable of attaining yield strength and fracture toughness when processed as disclosed in Rioja '859.

In comparing the claimed aluminum alloys encompassed by appealed claim 19 with the aluminum-lithium alloys disclosed by Rioja '859, we find with respect to each of the two groups of alloys in the reference, that the claimed weight percent ranges, including the weight percent ranges disclosed for Zr, Fe, Mn and Ag which can be present, either fall *within* or *encompass* the weight percent ranges in the reference, except for the amount of Cu and Li. The claimed and reference Cu weight percent ranges *overlap* in the first group of the reference alloys, and the claimed Cu weight percent range falls within the Cu weight percent range in the second alloy group of the reference. With respect to Li, the claimed weight percent range overlaps the reference weight percent range is at the lower end of the ranges, that is, "0.1" in appealed claim 19, and "0.2" in each of the first alloy group of Rioja '859. With respect to the second alloy group of the reference, the lower end of the Li range, that is, "0.5," is close to the upper end of the claimed Li range, that is, "0.4." Furthermore, Rioja '859 teaches that the processes of working the aluminum alloys disclosed therein is capable of attaining yield strength and fracture toughness with the disclosed alloys within ranges which overlap with the ranges for these properties in appealed claim 19.

We find that in each of the groups of alloys of Rioja '792 and '859 set forth above, aluminum and incidental impurities form the remainder of the alloy in the same manner as in appealed claim 19 as we interpreted this claim above.

Therefore, we find that each of Rioja '792 and '859 provides substantial evidence establishing that, *prima facie*, one of ordinary skill in this art routinely working within the teachings of these references would have arrived at aluminum lithium alloys falling within the aluminum lithium alloys encompassed by appealed claim 19, which have the capability of attaining the yield strength and fracture toughness properties when worked by any process that can confer such properties. Furthermore, with respect to those claimed and prior art aluminum lithium alloys which have a slight overlap with respect to the weight percent ranges of Cu and Li, or wherein the upper and lower ends of the Li range are close, on this record, we determine that, *prima facie*, one of ordinary skill in this would have reasonably expected that such claimed aluminum alloys would have the same properties as the aluminum lithium alloys of the references in each instance. Indeed, each of the references address the contributions to the aluminum lithium alloys made by Cu and Li as we found above. Accordingly, one of ordinary skill in this art routinely following the teachings of the references would have arrived at the claimed aluminum alloys without recourse to appellants' specification. *See generally, In re Peterson*, 3156 F.3d 1325, 1330, 65 USPQ2d 1379, 1382 (Fed. Cir. 2003); *In re Geisler*, 116 F.3d 1465, 1470, 43 USPQ2d 1362, 1365 (Fed. Cir. 1997), citing *In re Malagari*, 499 F.2d 1297, 1303, 182 USPQ 549, 553 (CCPA 1974); *Haynes Int'l, Inc. v. Jessop Steel Co.*, 8 F.3d 1573, 1576-77, 1577 n.3, 28 USPQ2d 1652, 1654-55, 1655 n.3 (Fed. Cir. 1993); *In re Woodruff*, 919 F.2d 1575, 1577-78, 16 USPQ2d 1934, 1936-37 (Fed. Cir. 1990); *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775,783, 227 USPQ 773, 779 (Fed. Cir. 1985); *In re Boesch*, 617 F.2d 272, 276, 205 USPQ 215, 219 (CCPA 1980); *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955).

Accordingly, since a *prima facie* case of obviousness has been established over each of Rioja '792 and '859, we have again evaluated all of the evidence of obviousness and nonobviousness based on the record as a whole, giving due consideration to the weight of appellants' arguments in the brief and reply brief and the evidence in the specification as relied on in the brief and reply brief. *See generally, In re Johnson*, 747 F.2d 1456, 1460, 223 USPQ 1260, 1263 (Fed. Cir. 1984); *In re Piasecki*, 745 F.2d 1468, 1472, 223 USPQ 785, 788 (Fed. Cir. 1984); *In re Rinehart*, 531 F.2d 1048, 1052, 189 USPQ 143, 147 (CCPA 1976).

Appellants submit that the groups of aluminum lithium alloys of each of Rioja '792 and '859 set forth above do not reflect the actual teachings of the references to those of ordinary skill in this art, pointing in this respect to specific examples of such alloys "actually made" or "actually treated" in the references (brief, pages 6, 8-9 and 9-10).

We do not agree with appellants' position because, as pointed out by the examiner (answer, pages 4-5), it is well settled that a reference is considered for all of the specific teachings thereof as well as the inferences one of ordinary skill in this art would have reasonably been expected to draw therefrom, and not merely from the limited or working examples. *See generally*, *Merck & Co., Inc. v. Biocraft Labs., Inc.*, 874 F.2d 804, 807, 10 USPQ2d 1843, 1846 (Fed. Cir. 1989), quoting *In re Lamberti*, 545 F.2d 747, 750, 192 USPQ 278, 280 (CCPA 1976) ("But in a section 103 inquiry, 'the fact that a specific [embodiment] is taught to be preferred is not controlling, since all disclosures of the prior art, including unpreferred embodiments, must be considered.'"). Indeed, each of Rioja '792 and '859 would have instructed one of ordinary skill in this art that in each of the alloy groups of these references we set forth above, the selection of an amount for each element falling within the weight percent range for that element will result in an alloy which has the properties taught in the reference when processed as disclosed therein, the selection of the amount of an element following the teachings of the reference with respect to properties of the result alloy being within the ordinary skill of this person. Indeed, we will not hear the assignee of the present application and of each of Rioja '792 and '859 to assert that Rioja '792 claims 1 (product) and 19 (process) and Rioja claims '859 process claims 13, 21, 36, 37, 43, 44, 49 and 50 do not encompass each and every alloy within the groups of alloys set forth therein, which is the clear interpretation of the language of these claims.

Appellants correctly contend that the disclosure in the first alloy group from Rioja '859 cited above has a lower limit on the Li weight percent range of 0.5 which does not overlap with the upper limit of the claimed Li weight percent range of 0. 4 (brief, pages 5-6). However, we find that one of ordinary skill in the art would have expected that alloys which differed in this respect to have the same properties. *See Titanium Metal*, *supra* ("[T]he Russian article discloses two alloys having compositions very close to that of claim 3, which is 0.3% Mo and 0.8% Ni, balance titanium. The two alloys in the prior art have 0.25% Mo - 0.75% Ni and 0.31% Mo - 0.94% Ni, respectively. The proportions are so close that prima facie one skilled in the art would have expected them to have the same properties.").

Appellants allege that they "have demonstrated that the use of small amounts of Li in Al-Zn-Cu-Mg alloys, as presently claimed, results in an unexpected increase in the mechanical properties of the alloys" as seen from "Fig. 1 of the application [which] demonstrates that the use of the claimed range of from about 0.10 to 4.0 wt % lithium improves the yield strengths of the alloys in comparison with similar alloys containing either no lithium, or a greater amount of lithium" (brief, page 14). Appellants point out that

> the leftmost set of data points in Fig. 1 are for "Aging Condition No. 1" which corresponds to a T3 aging condition. Alloy D (0.62 wt % Li) which is outside the presently claimed alloy range has a significantly lower Tensile Yield Strength in the T3 condition than either Alloy B (0.25 wt % Li) or Alloy C (0.36 wt % Li) which are inside the presently claimed alloy range. As a further example, the set of data points for Aging Condition No. 6 in Fig. 1 demonstrates that Alloys B and C within the presently claimed alloy range have significantly higher Tensile Yield Strengths than Alloy A (zero Li) which is outside the presently claimed alloy range." [*Id.*, page 15.]

Appellants submit in the brief FIG. 1a which

> presents the data in Fig. 1 in a different way. Fig. 1a plots Tensile Yield Strength (TYS) versus Li amount for the data sets in Fig, 1 corresponding to Aging conditions No. 1 (T3 condition) and Aging Condition No. 6 (T8 condition).
>
> . . . .
>
> As shown in Fig. 1a, in the T3 condition, the Tensile Yield Strength of Alloy D having 0.62 wt % Li drops off significantly in comparison with the Tensile Yield Strength of Alloys B and C having 0.25 wt % Li and 0.36 wt % Li, respectively. Fig. 1a also shows that, in the T8 condition corresponding to Aging Condition No. 6 in Fig. 1, the Tensile Yield Strengths of Alloys B and C are significantly higher in comparison with Alloy A having no lithium.
>
> The foregoing figures demonstrate that unexpectedly improved yield strengths are achieved by adding the small amount of Li recited in Claim 19. The improved yield strengths achieved with the presently claimed alloy are particularly surprising in view of the teachings of the cited references, which direct those skilled in the art not to use less than 0.5 wt % Li. [*Id.*, pages 15-16.]

The examiner found in the Office action of June 18, 2002, that in Fig. 1, alloy D "has better tensile yield strength than alloy B . . . in conditions 2 and 8;" that "conditions 4-7, alloy B and alloy D have substantially same/overlap tensile yield strengths;" and that "tensile yield strengths of claimed alloy C . . . has less than 7% difference from alloy D in all conditions," and conclusion that "instant figure 1 fails to show the claimed Li range is critical from end-point to end-point." (Paper No. 14, page 5; *see also* answer, page 6). In response, appellants argue "that significantly increased tensile yield strengths are demonstrated in Fig. 1 for Alloy B and Alloy C . . . in comparison for Alloy D in Aging Condition No. 1 (the 'T3' condition depicted by the leftmost data points)" (brief, page 16).

In the answer, the examiner finds that Figure 1a fails to show the criticality of the claimed Li weight percent range "because for T3 temper . . . [alloy A,] 0% Li has the highest TYS" (Tensile Yield Strength) and for the T8 temper, "the TYS of . . . [alloy D] falls within the TYS range" achieved by alloys B and C (page 7). Appellants reply that Figures 1 and 1a demonstrate that the claimed alloys B and C "possess significantly higher tensile yield strengths in the T3 temper in comparison with" alloy D, pointing out that "[b]oth of the references . . . teach those skilled in the art that alloys with greater amounts of lithium have better properties" (reply brief, pages 3-4).

We find that alloys B (Ingot No. 2) and C (Ingot No. 3) differ from each other by 0.08 wt. % Zn, 0.01 wt. % Zr, and Fe being present only in alloy C in the amount of 0.01 wt. %, wherein alloy B contains 0.25 wt. % Li and alloy C contains 0.36 wt. % Li (specification, pages 7-8).

In contrast, alloy D (Ingot No. 4), now argued by appellants as representing the alloys of Rioja '792 and '859, contains 0.62 wt. % Li, additionally significantly differs from alloys B and C: 6.97 wt. % Zn which is a difference of 0.24 wt. % with B and 0.32 wt. % with C; 2.0 wt. % Cu which is a difference of 0.09 wt. % with B and C; 1.8 wt. % Mg which is a difference of 0.07 wt. % with B and C; 0.02 wt. % Si which is a difference of 0.01 wt. % with B and C; 0.10 wt. % Zr which is a difference of 0.01 wt. % with B and the same amount as C; and 0.01 wt. % Fe which is the same amount as C but absent from B.

We find that the results reported for specification FIG. 1 establish that in Aging Condition 1, the so-called "T3 condition," the TYS of alloy A is about 61 ksi, while that of alloys B and C is a virtually identical ksi of between 60 and 61, and that of alloy D is a ksi of about 57. Thus, the difference in TYS between alloys B and C and alloy D is about 3.5 ksi.

We further find that the examiner has correctly found that the results with the different Aging Conditions Nos. 2 through 8 depicted in specification FIG. 1 establish that the TYS of alloy D differs from alloys B and C by no more than several ksi, and generally at a ksi between B and C. Indeed, it reasonably appears from the data as reported in specification FIG. 1 that the ksi of alloys B and D are virtually identical at Aging Conditions 4 through 7, including Aging Condition 6, the so-called "T8 condition," and within 1 ksi at Aging Conditions 2, 3 and 8; and that the ksi of alloys C and D are virtually identical at Aging Condition 8, the difference between alloys C and D being about 1 ksi at Aging Condition 7, about 2 ksi at Aging Conditions 2, 3 and 6, and about 3 ksi at Aging Conditions 4 and 5.

Based on the limitation "the alloy is *capable* of attaining a yield strength (L) above about 80 ksi" (emphasis supplied), we find that alloys B and D achieved this level when worked at Aging Conditions 2 through 5, 7 and 8, alloys B and D being at about 78 ksi when worked at Aging Condition 6, with alloy C being at about 80 ksi for each of the Aging Conditions.

We find no explanation in the specification of the significance of the differences in the Aging Conditions employed. Appellants disclose that "t]he aluminum alloy comprises . . . from about 0.10 to about 0.99% lithium" and that "[i]t has been found . . . ancillary additions of low levels of lithium to aluminum-zinc alloys provided a high strength . . . that exhibits good fracture toughness . . . over aluminum-zinc alloys without lithium additions and those aluminum-zinc alloys having lithium additions above 1.0 wt %" (page 1, line 27, to page 2, line 7). Appellants further disclose with respect to "strength" that "the alloy of the invention has good strength . . . . The yield strength (L) of the alloys of the invention are preferably above about 80 ksi and more preferably above about 85 ksi" (*id.*, page 4, lines 7-10).

Appellants, in describing the results shown in specification FIG. 1, state only that "[i]t will be seen that the alloys having lithium additions[, that is, alloys B, C and D,] exhibit greater strength than those without lithium[, that is, alloy A], while at the same time exhibiting thermal stability" (*id.*, page 9, lines 15-17). No distinction in result between alloys B, C and D is set forth in the specification, the distinction being drawn only with respect to alloys B, C and D as a whole vis-à-vis alloy A in support of the disclosure of the disclosed aluminum alloy having lithium between 0.10 and 0.99 wt % lithium. There is no other evidence in the specification with respect to alloy D.

With respect to the disclosure that "[t]he alloy of the invention will also preferably have a combination of (i) good strength and (ii) fracture toughness of preferably (i) above 80 ksi and (ii) above 30 ksi√inch" (specification, page 4, lines 13-16), and the claimed limitation "the alloy is capable of attaining a yield strength (L) above 80 ksi and a fracture toughness above about 33 ksi√inch," we find no evidence with respect to "fracture toughness" in either specification FIG. 1 or brief Figure 1a.

It is well settled that the burden of establishing the significance of data in the record with respect to unexpected results rests with appellants, which burden is not carried by mere arguments of counsel. *See generally, In re Geisler*, 116 F.3d 1465, 1470, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997); *In re Merck*, 800 F.2d 1091, 1099, 231 USPQ 375, 381 (Fed. Cir. 1986); *In re Longi*, 759 F.2d 887, 897, 225 USPQ 645, 651-52 (Fed. Cir. 1985); *In re Klosak*, 455 F.2d 1077, 1080, 173 USPQ 14, 16 (CCPA 1972); *In re Lindner*, 457 F.2d 506, 508, 173 USPQ 356, 358 (CCPA 1972); *In re D'Ancicco*, 439 F.2d 1244, 1248, 169 USPQ 303, 306 (1971). Appellants have not carried this burden on this record.

Appellants' reliance on the data reported for Alloys A, B and C for Aging Condition 6 is misplaced because alloy A contains no Li and accordingly, evidence based thereon vis-à-vis aluminum lithium alloys B and C does not reflect the thrust of the rejection that the claimed aluminum lithium alloys are obvious over the aluminum lithium alloys disclosed and claimed in Rioja '792 and disclosed in Rioja '859, which is the closest prior art, as we discussed above. *See e.g., Baxter Travenol Labs.*, *supra* ("[W]hen unexpected results are used as evidence of nonobviousness, the results must be shown to be unexpected compared with the closest prior art. [Citation omitted.]"); *In re Burckel*, 592 F.2d 1175, 1179-80, 201 USPQ 67, 71 (CCPA 1979) (the claimed subject matter must be compared with the closest prior art in a manner which addresses the thrust of the rejection)..

The comparison of aluminum lithium alloys B and C with alloy D at Aging Condition 6 does reflect the thrust of the rejection because each of the alloys fall within the group of alloys disclosed at col. 2, lines 62-66, of Rioja '792 and the two groups of alloys set forth above from Rioja '859 in view of the 2.09 wt. % Cu in each of alloys B and C and the 2.0 wt. % Cu in alloy D.

Appellants rely on a comparison between claimed alloys B and C and now "prior art" alloy D as set forth for Aging Condition 1, the "T3 condition," as well as for Aging Condition 6, the "T8 condition," shown in specification FIG. 1. We cannot subscribed to appellants' position that the results reported for these two Aging Conditions in specification FIG. 1 and as restated in brief Figure 1a establish the criticality of the claimed aluminum lithium alloys and thus patentably distinguish the claimed aluminum lithium alloys over the closely related alloys disclosed and claimed in Rioja '792 and disclosed in Rioja '859, such claims and disclosures encompassing all of the tested alloys, for several reasons.

We cannot agree with appellants that the difference between claimed alloys B and C and now "prior art" alloy D is "significant" with respect to either Aging Condition. We found above that as reported in specification FIG. 1, the difference in TYS at Aging Condition 1 between claimed alloys B and C, which have a virtually identical ksi of between 60 and 61, and prior art alloy D, which has a ksi of about 57, is about 3.5 ksi; and that at Aging Condition 6, the ksi of claimed alloy B and prior art alloy D are virtually identical, while the difference between claimed alloy C and prior art alloy D is about 2 ksi. Indeed, we find that this is the actual difference in results between these two sets of alloys, whether taken as reported in specification FIG. 1 or restated as shown in brief Figure 1a, and indeed, appellants state that brief "Fig. 1a represents the data in Fig. 1 in a different way," not that it is different data.

Appellants have presented no scientific explanation or objective evidence explaining the practical significance of the numerical difference between the claimed and prior art alloys attained at either Aging Condition *per se*, with respect to whether such results are unexpected. *See, e.g.*, *Klosak*, 455 F.2d at 1080, 173 USPQ at 16, citing *D'Ancicco*, *supra* ("[I]t is not enough to show that results are obtained which differ from those obtained in the prior art: that difference must be shown to be an *unexpected* difference.").

Furthermore, nowhere on this record has appellants established the practical significance of testing at Aging Condition 1 vis-à-vis Aging Condition 6, or the practical significance of either of these Aging Conditions vis-à-vis the other Aging Conditions which are akin to Aging Condition 6. Indeed, with respect to the latter, from appealed claim 19, the written description in appellants' specification and the disclosure in each of Rioja '792 and '859 that we discussed above, it is apparent that a TYS for an aluminum lithium alloy of about 80 ksi or higher is desirable. Thus, on this record, we determine the evidence with respect to Aging Conditions 2 through 8 is more significant than the evidence with respect to Aging Condition 1. *See In re Nolan*, 553 F.2d 1261, 1267, 193 USPQ 641, 645 (CCPA 1977).

However, there is no basis in the record to distinguish between the results obtained between claimed alloys B and C and prior art alloy D in Aging Conditions 2 through 8, and as we discuss above, the results reported in specification FIG. 1 consistently show little difference between these three alloys. Indeed, the virtual identity in performance between claimed alloy B and prior art alloy D is remarkable, particularly in view of the numerous differences in the amounts of the elements between these two alloys that we found above, which differences do not support appellants' contention that the evidence represents the difference in the amount of lithium *per se* contained by the alloys. *See In re Dunn*, 349 F.2d 433, 439, 146 USPQ 479, 483 (CCPA 1965) ("[W]e do not feel it an unreasonable burden on appellants to require comparative examples relied on for non-obviousness to be truly comparative. The cause and effect sought to be proven is lost here in the welter of unfixed variables."); *see also In re Heyna*, 360 F.2d 222, 228, 149 USPQ 692, 697 (CCPA 1966). In this respect, we found above (*see* pp. 7 and 9) that the references would have suggested to one of ordinary skill in this art that the properties of the aluminum lithium alloys taught therein, including a TYS of about 80 ksi, can be achieved by varying amounts of elements, including teachings specific to Li and Cu, along with using the disclosed processing methods, and one of ordinary skill in this art would not have found in such teachings the direction to use at least 0.5 wt. % or more of lithium as appellants' contend (brief, page 16).

Accordingly, we find that there is little, if any, evidence supporting appellants' position that the evidence establishes that the differences in result between the alloys reported in specification FIG. 1 are "significant" and patentably distinguish the claimed aluminum lithium alloys encompassed by appealed claim 19 over the aluminum lithium alloys in the groups of alloys set forth above from Rioja '792 and '859. *Lindner*, *supra* ("This court has said . . . that mere lawyers' arguments unsupported by factual evidence are insufficient to establish unexpected results. [Citations omitted.]").

Therefore, we find that the evidence relied on as a whole, viewed either in specification FIG. 1 or brief Figure 1a, is evidence of obviousness rather than nonobviousness.

Accordingly, based on our consideration of the totality of the record before us, we have weighed the evidence of obviousness found in each of Rioja '792 and '859 with appellants' countervailing evidence of and argument for nonobviousness and conclude that the claimed invention encompassed by appealed claims 19, 21 through 35, 37 and 40 through 44 would have been obvious as a matter of law under 35 U.S.C. § 103(a).

The examiner's decision is affirmed.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 CFR § 1.136(a).

AFFIRMED

CHARLES F. WARREN Administrative Patent Judge	)	
	)	
ROMULO H. DELMENDO Administrative Patent Judge	)	BOARD OF PATENT APPEALS AND INTERFERENCES
	)	
BEVERLY A. PAWLIKOWSKI Administrative Patent Judge	)	

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